

Ethnobotanical Survey of Local Wisdom Knowledge on Medicinal Plants Used by the Traditional Phouthai Ethnic Group in NaKeu Village, Hinboun District, Khammouan Province, Lao PDR

Khamphilavong Khambaya (✉ khamp006@yahoo.com)

Northwest Agriculture and Forestry University <https://orcid.org/0000-0002-6584-9975>

Lili Zhang

Northwest Agriculture and Forestry University College of Forestry

Yongxiang Kang

Northwest Agriculture and Forestry University College of Forestry

Hua Li

Northwest Agriculture and Forestry University College of Forestry

Liru Wang

Northwest Agriculture and Forestry University College of Forestry

Nishantha Muththanthirige

Northwest Agriculture University College of Agronomy

Channy Samontry

National University of Laos Faculty of Forestry

Awais Muhammad

Northwest Agriculture and Forestry University College of Plant Protection

Souksamone Phangthavong

Birsa Agricultural University Faculty of Forestry

Research

Keywords: Ethnobotaniac, Medicinal Plants, Traditional local wisdom, Plant parts used and Treatment

Posted Date: September 21st, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-54642/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License. [Read Full License](#)

Abstract

Background: Plants have been a part of rural area's people life since prehistoric time, plants is important in the traditional cultures in the worldwide where human used it from birth to end of life. Idigen

This study was carried out to explore and recorded the plants and part used of plants for treating numerous people illness and disease by the traditional healers of the Phouthai ethnic group in Nakeu village, Hinboun district, Khammouan province, middle part Lao PDR for medicinal plants purposes. The current study was conducted, first, to identify plant species used as a remedy for human illness, diseases and health improve, and secondly to determine plant parts used, the technique of preparation and religious belief on the preferred source of healthcare an around Hinboun district, Khammouane province, Lao PDR.

Methods: Ethnobotanical data for this paper were gathering from 03 traditional healers, and 69 households, therefore including the household of both gender (husband or wife), and across different level of education, age group, as well as the level of experience and knowledge of medicinal plants use. Plant specimens were collected during field survey which had been collected from natural wild plant and home gardens, information on each medicinal plant was recorded by using the data capture form.

Results: We found 79 medicinal plants species, 51 families, and can't identifies 2 species. Among the tree 44 species, 55.70 %; shrub 20 species, 25.32 %; liana 12 species, 15.19 %; and gasses 3 species, 3.8 %, were used to treat 34 sicknesses. A designation of all recorded species including the plant family names, dialect names, part used, and process to preparation of treatment. The roots are the plant part most commonly used (36.70%), followed by the stem (25.31%), leaves (10.12%), liana (10.12%), whole plant (6.32%), fruits (6.32%), and bark (3.79%). The medicinal plants are prepared using dried plant parts while some other species are using in fresh form. Boiling, soaking with cold water or alcohol, crushing, and burning are main methods of preparation.

Conclusion: In this study, 79 medicinal plant species were documented as use in the treatment of different common sickness including stomach problem (gastrointestinal, flatulence, diarrhea, detox), kidney infections, fever, dysmenorrheal postpartum tonic, nervous system, skin disease, health tonic, lever infections, heart disease, dressing wounds, and others.

1. Introduction

Plants have been a part of rural area's people life since prehistoric time, plants is important in the traditional cultures in the worldwide where human used it from birth to end of life (De Boer and Lamxay, 2009; Lamxayet al, 2011). Medicine is the very important plant resource for people and constructions are built from different plant species (Pieroniet al., 2017). Plant derived medicine is used to treating illness and disease, health tonic and are important in primary healthcare around the world (Elkinget al., 2009), especially the people who are live in rural area is far from hospital. Even though, High percentage of the population also in developed countries such as Austraria, Canada, France, Belgium, America use traditional medicine (McFarland *et al.*, 2002; Molassiotiset al., 2005). As present time used modern medicines were formerly resolved or synthesized on the basis of plant derivatives which serves as a stratagem (Fabricant and Farnsworth, 2001; Iwu, 2002; Lu et al., 2011), looking for bioactive compounds from plants consumes large amounts of time, specialists, and funding, and the look for traditional medicinal plants can, therefore, help to reduce costs for pharmacy discoveries. At the same time, traditional knowledge is being eroded by several processes related to globalization and urbanization (Ragupathy et al., 2008; Srithiet al., 2009). As people in each region of the world have different historical backgrounds, cultures, lifestyles, and since the floras of their environment are different, patterns of their used of plants for medicine also vary, for instance by using different plant species and plant parts, methods of preparations, and applications (Kichuet al., 2015; Menaleet al., 2016).

The use of a plant for medicine is normally strictly related to a specific part of the plant such as roots, stems, leaves (Asowatata-Ayodeteet *al.*, 2016, Ouelbaniet al., 2016, Agbodekeet *al.*, 2016, Birruet *al.*, 206), although some mode preparations can use any or all parts of a plant. The culling of plant part will often depend on which organ has the highest concentration of the bioactive substance that functions in the treatment (Abbasiet al., 2010, Abbas et al., 2016, Chekole., 2017, Dhamaet al., 2018), but since not all traditional medicine depends on physiological effects other parts may also be used. The preparation of the medicine modifies from lineage, which may use various solvents such as Boiling, soak with water or alcohol (Rametet al., 2018, Asawata-Ayodeleet *al.*, 2016, Lamxayet al., 2011), to crushing without extraction, to ingestions without any preparation. And the medicine may be prepared as a drink or a pill or used without any preparation. Finally, the way of administering the medicine varies from ingestion to inhalation of smoke, to external application to affected parts of the body (Jai-aeuet al., 2014, Baruahet al., 2016, Jahandidehet *al.*, 2016). All these variations have cultural, geographic and temporal dimensions.

The rural people almost exclusive on traditional medicine for their primary healthcare, their dependence on medicine is high due to lack of modern healthcare services (Lu et al, 2011, Delang. 2007). Even though the communities have known and used a lot of medicine plants, but no one has written their knowledge for future use (Pooma and Suddee, 2014, Hidayatiet al., 2015). The most of local knowledge which are still available among traditional healers is another be lost or passed to next young generation only by the oral word (Park et al., 2018). Besides, lack of adequate referent on knowledge of ethnomedicinal plants use among often cited problems in the study site (Birhanuet al., 2015, Staubet al.,

2015). The current study was conducted, first, to identify plant species used as a remedy for human illness, diseases and health improve, and secondly to determine plant parts used, the technique of preparation and religious belief on the preferred source of healthcare an around Hinboun district, Khammouane province, Lao PDR.

2. Materials And Methods

2.1 Study area

The Khammouane province, one of a province in middle part of Lao PDR as presented in Fig. 1. The land area of 16,315 km², and is almost of forest mountain terrain. The province share bordered with Savannakhet province to the south, Bolikhamxay province to the north and northwest, Thailand to the west, and Vietnam to the east. The forest area encloses of three store areas. These are the PhouHinPhoun National Biodiversity Conservation Area with an area is 150,000 ha, Nakai-Nam Thern National Biodiversity Conservation Area has cover areas is 352,200 ha, and Hin Nam No National Biodiversity Conservation Area with an areas 86,229 ha.

The study was conducted in Nakeu village, Hinboundistrict. In this part of Khammouane province traditionally inhabited by the Phouthai people. It is located 33 km far away from the town, the geographically situated between 17°64' – 86°78' N and 140°78'–48°57' E, the total land area of 35,863 ha (Fig. 1). The mean monthly temperature is 32 °C, ranging from 15 °C to 38 °C, and total rainfall is 1200 mm, ranging from 600 to 1600 mm (Statistical Authority, 2017). The population of the study site is amounted to 960 people, female is 465 people all most of them is Phouthai people.

2.2 Ethnobotanical data collection

Looking at the traditional healer in the Hinboun district area was conducted with the first agreement of citation by community leaders of each household. Our research team started an interaction with each expected respondent by explaining the aim of the study in order to solicit their consent and co-operation before any ethnobotanical data gathering. While this group discussion the research team was emphasized the extensive value which each traditional healer's contribution can make the compilation a recorded of traditional knowledge of medicinal plants in Hinboun district area.

Whit the helping of a commenter, all interviews and discussions were conduction in Nakeu village. Ethnobotanical data for this paper were gathering from 03 traditional healers, and 69 households, therefore including the household of both gender (husband or wife), and across different level of education, age group, as well as the level of experience and knowledge of medicinal plants use. In every part of the field survey, semi-structured interviews and group discussions were conducted in order to collect the local wisdom information about medicinal plants. The question was designed to focus on the local names of plants, their multitudinous medicine application, the part of used, the methods of preparation, and handle treatment to patients.

2.3 Plant collection and plant identification

The field survey was undertaken with randomly selection household on a descriptive statistics was employed to analyze and summarize the data on report medicinal plants, part of used, mode of preparation, ministry, the postulate of used, habitats of medicinal plant, and influence of realization, religious beliefs and culture on the extra source of healthcare. Plant specimens were collected during field survey which had been collected from natural wild plant and home gardens, information on each medicinal plant was recorded by using the data capture form. Certain medicine plants were identified in the field and remaining ones identified through published floras and another reference. After identifying medicinal plants, a photograph and herbarium specimen of each medicinal plant was taken in the herbarium at Faculty of Forestry Science, the National University of Laos for comparison and verification of each plant's scientific name.

3. Result And Discussion

3.1 Medicinal plants species

From this research it was found that among the 33 respondents who were interviewed, the majority was falling within the villagers (30 people) and healers (3 people). The total of 79 species, and 51 families, and can't identifies 2 species. Among the tree 44 species, 55.70 percentage; shrub 20 species, 25.32 percentage; liana 12 species, 15.19 percentage; and grasses 3 species, 3.8 percentage (Table 1) were used to treat 34 sicknesses. A designation of all recorded species including the plant family names, dialect names, part used, and process to preparation of treatment show in Table 1.

The study indicated 32 species (40.50%) that are used for medicinal purposes by traditional healers, 13 species (16.45%) are used by villagers, and 34 species (43.03%) used by both (healers and villagers) (Fig. 2).

Plants are most frequently used for the treatment of the sickness such as stomach problems, nervous system, kidney infection, liver tonic, menstrual cycle, and postpartum tonic (55.69%) which shown in Fig. 3 and Table 1. These results are followed by the pattern found in medicinal plant studies around the world, such as in Brazil (Bolson *et al.*, 2015), India (Kichuet *al.*, 2015), Italy (Fortini., 2016). The roots are the plant part most commonly used in this community (36.70%), followed by the stem (25.31%), leaves (10.12%). leaves are commonly used like medicine in many parts in developing countries (Yemeleet *al.*, 2015; Mukunguet *al.*,2016; Fortiniet *al.*, 2016), and using leaves for medicine is a sustainable way of using plants (Mukunguet *al.*, 2016). From this research it is concluded that the liana (10.12%),whole plant (6.32%), fruits (6.32%), and bark (3.79%) were used for treatments which shown in Fig. 4, the most used part of the plant are roots(35%), because of their availability throughout the year, traditionally considered to be strong medicine, have a good smell and easy to drink. the roots are being used in different medicine manufacturing more frequently, because sometime it's difficult to use other plant parts due to presence of phytochemecal compounds (Singh *et al.*, 2016)

The medicinal plants listed in Table 1 are used for the treatment of 34 sicknesses. Most of the villagers and traditional healers make medicine by boiling and distilling medicinal plants, that methods were also used by (Gadisa*et al.*, 2018, Methee*et al.*, 2018, Mahwasane*et al.*, 2013). Medicine preparation methods of dominate treatments vary from drying and burning the plants for treating warts with the smoke and crushing. (Alemayehuet *al.*, 2015, Chekole*et al.*, 2017, Girmay and Teshome 2017) in their study also mention the mode of remedy preparation to the charred remains are used as a dressing on wounds.

The villagers and traditional healers usually collected the medicinal plants from different fields, plans parts were dry and crushed before storing in bag or bottles. This method is also similar with (Gadisa*et al.*, 2018). It is very difficult for patients to recognize plants species that are used for their treatment, which sometimes seem ordinary plants that growing in gardens or in field. Some villagers prefer to store plants material in dry or powdered form inside bottles or plastic bags to reduce the field collection trips and make sure the availability of plants part possible throughout the year.

Table 1

Ethnobotanical information of medicinal plants uses by villagers and healers to treat sickness in Nakeu village, Hinboundistrict, Khammouane province, Laos.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
1	NaoNarm	<i>Artabotrys spinosus</i> Craib	Annonaceae	Onvilay et al. 2016	hl	tree	t	The stem is boiled and mixture drank to treating kidney infection.
2	Theangseang	<i>Cananga latifolia</i>		Southavong et al. 2014	both	tree	r	Roots are soaked in cold water for 2–3 day drank to bring down fever
3	Som Lom	<i>Aganonerion polymorphum</i> P.	Apocynaceae	Onvilay et al. 2016	hl	liana	r	Roots are boiled and mixture drank to treating kidney stone.
4	Chum Pha	<i>Plumeri alba</i>		Onvilay et al. 2016	vl	tree	r	The roots are boiled and drank for nervous pain.
5	Teen Phet	<i>Alstonia scholaris</i> L.		Newman et al. 2007	vl	tree	t	The stem is boiled and mixture drank to treating paralysis.
6	Puk Nork	<i>Centella asiatica</i> (L.) Urban	Apiaceae	Lamxay et al. 2011	vl	shrub	wh	The whole plant boiled and mixture drank for alleviating numbness, aches and pains in the body.
7	Pha Rai	<i>Schefflera elliptica</i> (Blume) Harms	Araliaceae	Southavong et al. 2014	hl	tree	r	The roots are boiled and drank for stomach problems.
8	Kok Tang Kai	<i>Scheffera octophylla</i> (Loureiro) Harms		Southavong et al. 2013, 2014	both	tree	t	Stem cut is small piece are soaked with alcohol and drank for nervous system.
9	Ya Far Rang	<i>Chromolaena odorata</i> (L.) R. King & H. Robinson	Asteraceae	Lamxay et al. 2011	vl	shrub	t	The stem is boiled and mixture drank for stomach detox
10	Warn Hang	<i>Aloe vera</i> L.	Asphodelaceae	Southavong et al. 2013	both	tree	r	Roots are soaked with alcohol and mixture drank for sexual performance.
11	Mai Khea Laow	<i>Haplophrama adenophyllum</i>	Bignonaceae	Southavong et al. 2013	both	tree	r	Roots are boiled and mixture drank for stomach problems.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
12	Lin Mai	<i>Oroxylum indicum</i> (L.) Kurz		Newman et al. 2007	vl	tree	t	The stem is boiled and mixture drank to treating emaciation.
13	Nard Narm	<i>Buddleja asiatica</i> Lour.	Buddlejaceae	Southavong et al. 2013	both	shrub	r,t	Roots are boiled and mixture drank for aweary, post-partum tonic, cough and bruises.
14	Sakharm	<i>Peltophorum dasyrachis</i>	Casalpiniaceae	Southavong et al. 2013	both	tree	r	Roots are boiled/soaked with alcohol drank for infertility, dysmenorrhoea and to improved sexual performance
15	Mai Tew	<i>Cratoxylonformosum</i> (jacq) Dyer	Clusiaceae	Southavong et al. 2013	hl	tree	t	The stem is boiled or soaked with alcohol and drank for nourish the body.
16	Mark KharmKheu	<i>Cnestismiflora</i> Griff	Connaraceae	Southavong et al. 2013	both	liana	ln	Liana are boiled or soaked with alcohol and drank for health tonic
17	HuaEung	<i>Costusspeiosus</i> (Koechnig)	Costus	Onvilay et al. 2016	hl	shrub	t	The stem is boiled and mixture drank to treating kidney infection.
18	Mark Keae	<i>Combretum quagrangulare</i> Kurz	Combretaceae	Southavong et al. 2014	both	tree	t,l	Stem and leaves crushed rubbed on body or used fruits and leaves are boiled as bath to treating rash on body/anti-allergy.
19	Han Drang	<i>Artocarpu</i> ssp.		Newman et al. 2007	hl	tree	f	The dry's fruits are boiled and mixture drank to alleviating jaundice
20	KraDeang	<i>calycopteris floribunda</i> (Roxn.) lamk.		Southavong et al. 2014	hl	liana	ln	The liana is boiled and drank for bring down fever.
21	Ya Khum Pao	<i>Carexbaccans</i> Nees.	Cyperaceae	Onvilay et al. 2016	hl	gasses	r	Roots are boiled and mixture drank to treating kidney problems.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
22	Hark Kha Jai	<i>Cyperuselatus</i> L.		Southavong et al. 2013, 2014	both	shrub	t	Stem are boiled and mixture drank to stop diarrhea.
23	Khean Hin	<i>Hopea ferreapierre</i>	Dipterocarpaceae	Hua &Tzen-Yuh 2017	hl	tree	b	Bark are soaked with cold water or boiled and drank for alleviating diarrhea.
24	Thonpheang	<i>Dillenia baillonii</i>	Dilleniaceae	Southavong et al. 2014	both	tree	r	Roots are soaked in cold water for 2–3 day drank to bring down fever
25	Mai Mark San	<i>Dillenia</i> Sp.		Southavong et al. 2014	hl	tree	r	Roots are boiled and mixture drank to treating liver disease.
26	KeauKra	<i>Diospyros mollis</i>	Ebenaceae	Southavong et al. 2013	hl	tree	r	The roots boiled or soaked with alcohol and drank for nourish the body or health tonic.
27	Mai Moun	<i>Elaeocarpus siamensis</i>	Elaeocarpaceae	Hua &Tzen-Yuh 2017	both	tree	r	Roots are boiled and mixture drank for regulating menstrual cycle.
28	Hoo Shang	<i>Macaranga denticulate</i> (Blume)	Euphorbiaceae	Lamxay et al. 2011	both	shrub	l	The leaves are boiled and drank for stomach problem.
29	Mark Yao	<i>Vernicia montana</i> LOUR.		Southavong et al. 2013	vl	tree	t,l	Deduct stem or leaves and used resin rubbed on the papilla
30	Kang Pha	<i>Phyllanthus reticulates</i> Poir.	Euphobiaceae	Southavong et al. 2013	hl	tree	l	The leaves are soaked with cold water and drank for bring down fever.
31	Mai deang	<i>Xyliakerrii</i>	Fabaceae	Southavong et al. 2013	both	tree	r	Roots are soaked with cold water and the mixture drank for the postpartum tonic.
32	None Nai	-		Southavong et al. 2013	hl	shrub	r	Roots are boiled and mixture drank to treating liver disease, and nervous system.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
33	Pao Thong	<i>Leptostachya</i> sp.		Onvilay et al. 2016	both	tree	r	Roots are boiled and mixture drank to treating kidney problems.
34	HomSarmMeuang	<i>Moghanialatifolia</i>		Onvilay et al. 2016	hl	liana	r	The roots are soaked with alcohol, and drank for improved sexual performance, postpartum tonic.
35	PukKood Buang	<i>Gleichania linearis</i>	Gleicheniaceae	Southavong et al. 2013	both	shrub	r	Roots are boiled and mixture drank for treating flatulence.
36	KokTha Kai	<i>Salacia viminia wallich</i> ex lawon	Hippocrataceae	Onvilay et al. 2016	hl	shrub	t,l	The stem and leaves crushed and rubbed on body which has papilla.
37	Mai Ka Sao	<i>Holoptelea intergrifolia</i>	Holoptelea	Sydara et al. 2014	hl	tree	r	Roots are boiled and mixture drank to treating liver disease.
38	Sean Meuang	<i>Gonocaryum subrostratum</i> P.	Icacinaceae	Sydara et al. 2014	hl	shrub	t	The stem is soaked with cold water drank for jaundice.
39	PukieTou	<i>Ocimum</i> spp.	Labiaceae	Southavong et al. 2013	vl	shrub	t	The stem is boiled and mixture drank for stomach detox
40	Ya Nouad Meo	<i>Orthosiphon aristatus</i>	Labiatae	Onvilay et al. 2016	hl	gasses	wh	Whole plant is boiled and mixture drank to treating kidney problems.
41	Mai Mark Sang	<i>Litsea cubeba</i> (Lour.) Pers.	Lauraceae	Southavong et al. 2013	hl	tree	wh	Whole plants are boiled and mixture drank for purgative, tonic blood, malaria, and dizzy.
42	Zhouangnoy	<i>Cinnamomuminers</i>		Lamxay et al. 2011	both	tree	t	The stem cut is a small piece and boiled drank for easier to get pregnancy.
43	Pha Dong Mod lin	<i>Dalbergia</i>	Leguminoceae	Southavong et al. 2013	hl	tree	t	Stem are boiled and drank to treating papilla on the body.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
44	Sarm Hang	<i>Moghania macrophylla</i> (Willdenow) O. Kuntze	Leguminosae	Southavong et al. 2013	hl	shrub	t	Stem are soaked with cold water 2–3 day, drank for detox stomach.
45	Keua Charn	<i>Spatholobu sroxburghrr</i> Benth		Southavong et al. 2013	hl	liana	ln	The liana is boiled and drank for alleviating sore throat.
46	Kra Teo	<i>Pterolobium platypterum</i> Gagnepain		Onvilay et al. 2016	hl	liana	ln	The liana is boiled and mixture drank for stomach problem.
47	Mark Kharm	<i>Tamarindus indicus</i> Linn.		Southavong et al. 2014	vl	tree	b	The bark is burned and made it as the powder used as a dressing on wounds to dry.
48	Khii Leck	<i>Cassia timoriensis</i> Dc.	Lythraceae	Hua & Tzen-Yuh 2017	vl	tree	t,l	The stem is boiled and drank or leaves cooked dish for sleep well.
49	Kok Peuay	<i>Lagerstroemia floribunda</i>		Newman et al. 2007	hl	tree	b	Bark soaked with cold water 15–20 minute and drank or leaves are chewed and swallowed for diarrhea.
50	Fai Lang	<i>Eriolaena candollei</i> Wallich		Southavong et al. 2013	vl	tree	r	The roots are boiled and drank for stomach problems.
51	Keu Haerm	<i>Cosciniium fenestratum</i>	Menispermaceae	Southavong et al. 2013	both	liana	r	Roots made is dry and boiled drank for gastrointestinal.
52	Keu Khaohor	<i>Tinospora crispa</i>		Southavong et al. 2013	both	liana	ln	Liana's fresh or dry are boiled and drank for Scabies, ringworm.
53	Hum Vang/Hum Hork	<i>Ficushisuta</i> Vahl	Moraceae	Newman et al. 2007	hl	shrub	r	Roots are boiled and drank for health tonic, nervous system.
54	Som Phor	<i>Streblus asper</i> LOUR		Hua & Tzen-Yuh 2017	both	tree	f	The fresh fruit are soaked with warm water and drank to treating cough or common cold.
55	Deau Pong	<i>Ficus hispida</i> L.f.		Lamxay et al. 2011	both	tree	t	Stem is boiled and mixture drank for bring down fever.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
56	Hang Kuang	<i>Gomphia serrata</i> (Gaertn) Kanis	Ochanaceae	MoNRE-IUCN, 2016	both	shrub	t	The stem is boiled and mixture drank for stomach problems.
57	Mai Mark Feung	<i>Averhoa yarlabora</i> L.	Oxalidaceae	Southavong et al. 2014	vl	tree	r	Roots are boiled and mixture drank to treating kidney problems.
58	Tong Teeb	<i>Pandanus amaryllifilius</i>	Pandanaceae	Southavong et al. 2014	vl	shrub	l	Used 3–5 leaves are boiled and drank to treating nerve pain/nervous system.
59	Trang Teep	<i>Glochidion brunneum</i> Hook. f.	Phyllanthaceae	Southavong et al. 2014	hl	Shrub	wh	The whole plant is boiled and mixture drank for stomach problems.
60	KharmPom	<i>Phyllanthusemblica</i> L.		Hua &Tzen-Yuh 2017	vl	tree	r,l,f	The stem and leaves are boiled and drank or fresh fruit eta directly for stomach problems.
61	Deuy Hin	<i>Coix aquatic</i>	Poaceae	Onvilay et al. 2016	hl	shrub	f	Fruits are boiled and mixture drank to treating kidney problems.
62	Mai KhoneTha	<i>Harrisonia perforate</i>	Rataceae	Southavong et al. 2013	both	shrub	r	Roots are boiled and mixture drank for stomach problems.
63	Seuakhong	<i>Ziziphus funiculosa</i> Ham.	Rhamnaceae	Southavong et al. 2014	both	liana	ln	The liana cut is a small piece and soaked in alcohol/boiled drank for infertility, dysmenorrhoea or syncope
64	Mai Pork	<i>Parinarium annamense</i> HANCE	Rocaceae	Newman et al. 2007	both	tree	r	Roots are boiled and mixture drank for stomach problems.
65	Kok Khao	<i>Haldina cordifolia</i> Roxb.	Rubiaceae	Onvilay et al 2016	both	tree	t	The stem cut is a small piece and boiled drank for stomach problems
66	Ya Ngoo Noy	<i>Hedyotisdiffusa</i> Willd.		Southavong et al. 2014	both	gasses	wh	Whole plant is boiled drank for health tonic.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
67	Khat Koa	<i>Randia simensis</i>		Southavong et al. 2014	both	tree	l	Juice from the crushed leaves is used as a dressing on wounds.
68	Som Kop	<i>Hymenodictyon excelsum</i> WALL		Southavong et al. 2014	both	tree	r	The roots are soaked with cold water and drank to treating fever.
69	Som Sheun	<i>Glycosmis parvifolia</i> (simds) little	Rutaceae	Onvilay et al. 2016	both	liana	ln	The liana is boiled and mixture, drank for treating fever.
70	Kok Ken	<i>Flacourtia rukam</i> Zoll.&Mor.	Salicaceae	Southavong et al. 2013	both	tree	r	Roots are boiled and mixture drank to treating stomach problems or diarrhea.
71	Nom Ngoua	<i>Scleropyrum pentandrum</i> (Dennst.) Mabb.	Santalaceae	Onvilay et al. 2016	both	tree	r	Roots are soaked with cold water drank for the postpartum tonic.
72	Wran Sa Noy	<i>Scopariadulcis</i> L.	Scrophulariaceae	Southavong et al. 2013	both	liana	ln	The liana of climber cut is a small piece mixture and boiled drank for alleviating easy labour or weary
73	Koun Tha	<i>Harrisonia perforate</i>	Simaroubaceae	Southavong et al. 2014	hl	tree	t	Stem are boiled and mixture drank to alleviating jaundice.
74	Bii Khon	<i>Brucea sumatrana</i> Roxb.	Simaroubaceae	Southavong et al. 2014	hl	shrub	f	Dry fruit are boiled and drank treating cholecystitis.
75	Ya Huoa	<i>Smilax glabra</i> Roxb	Smilacaceae	Southavong et al. 2013, 2014	both	liana	r	Roots are boiled/soaked with alcohol drank to improved sexual performance
76	Kok Khai Doun	<i>Turpinia pomifera</i> (Roxb.) DC.	Staphyleaceae	Southavong et al. 2013	hl	tree	l,f	Juice leaves crushed and rubbed on the body for skin disease, and fruit is crushed as a powder mixed with warm water and drank for heart disease.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

No	Dialect names	Scientific name	Family name	References	vg*/hl**	Plant form	Part used	Method of prepare
77	Hum Aow	<i>pterospermum semisagittatum</i>	Sterculiaceae	Newman et al. 2007	both	tree	t	The stem is boiled and drank for chest pain.
78	Pao Thong	<i>Leptostachya</i> sp	-	Onvilay et al. 2016	hl	tree	t	The stem is boiled and mixed with cold water and taken like bath for dysmenorrhea or postpartum tonic.
79	Khii Mou Kheua	<i>Castanopsis annamensis</i>	-	Southavong et al. 2014	hl	shrub	t	The stem is boiled and drank for treating jaundice.

Remake: vg* villagers, hl* healers; t, stem; l, leaves; r, roots; wh, whole plant; f, fruit; b, bark; ln, liana.

This research found that, the medicinal plant most usually used for the treatment of stomach problem (55.88%), followed by kidney infection (23.53%), fever (20.59%), Dysmenorrheal/Postpartum tonic (17.65), skin disease and nervous system (14.71%) each, health tonic and sexual performance (11.76%) each, Liver disease and Jaundice (8.82%), a weary and dressing wounds (5.88%), and while the following complains, namely pain, cough and bruises, purgative, tonic blood, malaria, dizzy, emaciation, heart disease and sore throat (2.94%) each (Fig. 5).

The main objective of this research was to keep the medicinal Plant knowledge in document form that used for treating different sickness since from ancient time and transfer orally from generation to the next generation. And the recording and maintaining of that knowledge in written form is also very useful for pharmaceutical purpose to developing advance medicine to treating these illnesses.

3.2 Traditional Medicine Formulae

Use for nervous system

Species name	Local name	Scientific name	Family	Part use	Dosage
	SomLom	<i>Aganonerionbpolymorphum</i>	Apocynaceae	Liana	10 g
	Nga None Nai	Not identified	Fabaceae	Roots	3 g
	NgaKhuoak	<i>Desmodiumtriquetrum</i>	Poaceae	Roots	7 g
Method of preparation: Take dried raw material and decoct in 1.5 liters of water. Drank as needed.					

Use for kidney inflammation

Species name	Local name	Scientific name	Family	Part use	Dosage
	Huoa-Eung	<i>Costusspeiosus</i> (Koechnig)	Costus	Stem	2 g
	NaoNarm	<i>Artabotrysspinosus</i> Craib	Annonceae	Stem	2 g
	Pao Thong	<i>Leptostachyasp</i>	Fabaceae	Roots	2 g
	YaKhumPao	<i>Carexbaccans</i> Nees	Cyperaceae	Roots	1 g
	DeuayHin	<i>Coix aquatic</i>	Poaceae	Fruit	0.05 g
	Sa Ly	<i>Zea mays</i>	Poaceae	Hair	1 g
	SomLom	<i>Aganonerionpolymorphum</i>	Apocynaceae	Roots	1 g
Method of preparation: Take dried raw material and decoct in 2 liters of water, and drank as need.					

Use as postpartum tonic

Species name			Part use	Dosage
Local name	Scientific name	Family		
KokKhao	<i>Haldinacordifolia</i> Roxb.	Rubiaceae	Roots	1 root
Nom Ngoua	<i>Scleropyrumpentandrum</i> (Dennst.)Mabb.	Santalaceae	Stem/Roots	2 root
YaHua	<i>Smilax glabra</i> Roxb	Smilacaceae	Roots	1 root
Sa Ly	<i>Zea mays</i>	Poaceae	Hair	1 g
HomSarmMeuang	<i>Moghania latifolia</i>	Fabaceae	Root	1 root
Sa Math	<i>Euodia lepla</i>	Rutaceae	Root	1 root
Method of preparation: Take dried raw material and decoct in 2 liters of water, and drank as need.				

4. Conclusion

It was found that the total 79 plant species that were used in traditional medicine in Hinboun district, Khammuoane province, Lao PDR. Of these a few species had high use values, suggesting that they may produce bioactive compounds with strong physiological effects. In this study, 79 medicinal plant species were documented as use in the treatment of different common sickness including stomach problem (gastrointestinal, flatulence, diarrhea, detox), kidney infections, fever, dysmenorrheal postpartum tonic, nervous system, skin disease, health tonic, lever infections, heart disease, dressing wounds, and others. The majority of these traditional medicinal plants are trees, shrubs, liana, and gasses that are mainly sourced from wild. Among the plant parts used, roots and stems are the most frequency used. The medicinal plants are prepared using dried plant parts while some other species are using in fresh form. Boiling, soaking with cold water or alcohol, crushing, and burning are main steps of preparation of medicine.

The current study also highlighted that realization and cultural beliefs have a significant influence on the unique source of healthcare, whereas religion was found to have no association with health-seeking behavior. Beyond, the immediate researchers believe that the therapeutic use of the identified and documented plants will provide basic data for further researches focus on pharmacological studies and the conservation of the most important medicinal plants in the study area.

Declarations

- **Ethics approval and consent to participate**

This paper our research teams from Faculty of Forestry Science National University of Laos. Plan worked was follow the role of Faculty and Province; by submitted the letter form Faculty to Province of Agriculture and Forestry Office, then province office will contract to District and from district to villages step by step. (supporting document on attract files or if need more detail contract to author by email)

- **Consent for publication**

Not applicable

- **Availability of data and materials**

Please contact author for data requests

- **Funding**

The program was financially supported by the Forestry Research Foundation for the Public Service from The State Forestry Administration of China," Research on Plant Diversity in Qinling Mountains"(2015,04320)

- **Competing interests**

The authors declare that they have no competing interests.

- **Authors' contributions**

Kang Yongxiang participated in the design of the study. Zhang Lily and Awais participated in the sequence alignment and drafted the manuscript. Souksamone and Channy conceived of the study and coordination and helped to data correction. Nishantha and Li Hua carried out the checking and ensure scientific name. All authors read and approved the final manuscript.

Acknowledgments

We would like very grateful to teachers of Department of Forest Community and Rural Development at Faculty of Forestry Science, National University of Laos for providing us field materials, and their students to helping us in collection data. We would also like to express our gratitude to the Province of Forestry Office. Thankfully to villagers and healers for their invaluable contribution to the study, and also thanks to all the staff in department of forestry at Hinboun district for graciously granting us permission to conduct our study.

References

- Abbas, Z., Khan, S.M., Abbasi, A.M., Pieroni, A., Ullah, Z., Iqbal, M., Ahmad, Z., 2016. Ethnobotany of the Balti community, Tormik valley, Karakorum range, Baltistan, Pakistan. *J. Ethnobiol. Ethnomed.* 12 (1), 38.
- Abbasi, A.M., Khan, M., Ahmad, M., Zafar, M., Jahan, S., Sultana, S., 2010. Ethno pharmacological application of medicinal plants to cure skin diseases and in folk cosmetics among the tribal communities of North-West Frontier Province, Pakistan. *J. Ethnopharmacol.* 128, 322–335.
- Agbodeka, K., Gbekley, H.E., Karou, S.D., Anani, K., Agbonon, A., Tchacondo, T., Batawila, K., Simpore, J., Gbeassor, M., 2016. Ethnobotanical study of medicinal plants used for the treatment of malaria in the Plateau Region, Togo. *Pharmacognosy Research* 8, S12–S18.
- Alemayehu, G., Asfaw, Z., Kelbessa, E., 2015. Ethnobotanical study of medicinal plants used by local communities of Minjar-Shenkora district, North Shewa zone of Amhara region, Ethiopia. *J. Med. Plants Stud.* 6, 01–11.
- and remedies in ethnomedicine and ethnopharmacology. *J. Ethnopharmacol.* 174,
- Aowata-Ayodele, A.M., Afolayan, A.J., Otunola, G.A., 2016. Ethnobotanical survey of culinary herbs and spices used in the traditional medicinal system of Nkonkobe Municipality, Eastern Cape, South Africa. *South Afr. J. Bot.* 104, 69–75.
- Aowata-Ayodele, A.M., Afolayan, A.J., Otunola, G.A., 2016. Ethnobotanical survey of culinary herbs and spices used in the traditional medicinal system of Nkonkobe
- Baruah, A., Bordoloi, M., DekaBaruah, H.P., 2016. Aloe vera: a multipurpose industrial
- Birhanu, Z., Endale, A., Shewamene, Z., 2015. An ethnomedicinal investigation of plants used by traditional healers of Gondar town, North-Western Ethiopia. *J. Med. Plants Stud.* 3, 36–43.
- Birru, E.M., Asrie, A.B., Adinew, G.M., Tsegaw, A., 2016. Antidiarrheal activity of crude methanolic root extract of *Idigoferaspicata* Forssk. (Fabaceae). *BMC Complement. Altern. Med.* 16 (1), 272.
- Bolson, M., Hefler, S.R., Dall'Oglio Chaves, E.I., Gasparotto Junior, A., Cardozo Junior, E.L., 2015. Ethno-medicinal study of plants used for treatment of human ailments, with residents of the surrounding region of forest fragments of Paraná, Brazil. *J. Ethnopharmacol.* 161, 1–10.
- Chekole, G., 2017. Ethnobotanical study of medicinal plants used against human ailments in Gubalafto District, Northern Ethiopia. *J. Ethnobiol. Ethnomed.* 13, 55
- Chekole, G., Asfaw, Z., Kelbessa, E., 2015. Ethnobotanical study of medicinal plants in the environs of Tara-gedam and Amba remnant forest of LiboKemken district, northwest Ethiopia. *J. Ethnobiol. Ethnomed.* 11, 4.
- crop. *Ind. Crops Prod.* 94, 951–963.
- De Boer, H., & Lamxay, V. (2009). Plants used during pregnancy, childbirth and postpartum healthcare in Lao PDR: A comparative study of the Brou, Saek and Kry ethnic groups. *Journal of Ethnobiology and Ethnomedicine*, 5(1), 25.
- Delang, C. O. (2007). The role of medicinal plants in the provision of health care in Lao PDR. *Journal of Medicinal Plants Research*, 1(3), 050-059.
- Dhama, K., Karthik, K., Khandia, R., Munjal, A., Tiwari, R., Rana, R., ... & Farag, M. R. (2018). Medicinal and therapeutic potential of herbs and plant metabolites/extracts countering viral pathogens-current knowledge and future prospects. *Current drug metabolism*, 19(3), 236-263.
- Elking, B.G; Southavong, B; Sydara, K; Souliya, O; Vanthanouvong, M; Nettavong, K; Thammachack, B; Dennis, H. Pak, Riley, M.C; Franzblau, S.G; Soejarto, D.D. 2009. Biological Evaluation of plants of Laos used in the Treatment of Tuberculosis in Lao Traditional Medicine Pharmaceutical (Formerly international journal of Pharmacognosy), Volume 47, Number 1, pp. 26-33

ethnobiology in Southeast Asia. J. Ethnobiol. Ethnomed. 11.

Fabricant, D.S., Farnsworth, N.R., 2001. The value of plants used in traditional medicine for drug discovery. Environ. Health Perspect. 109 (Suppl 1), 69–75.

Fortini, P., Di Marzio, P., Guarrera, P.M., Iorizzi, M., 2016. Ethnobotanical study on the medicinal plants in the Mainarde Mountains (central-southern Apennine, Italy). J. Ethnopharmacol. 184, 208–218.

GadisaDemie, MeseleNegash, TesfayeAwas., 2018. Ethnobotanical study of medicinal plants used by indigenous people in and around Dirre Sheikh Hussein heritage site of South-eastern Ethiopia. Journal of Ethnopharmacology; 220:87-03

Girmay, T., Testhome, Z., 2017. Assessment of traditional Medicinal plants used to treat human and livestock ailments and their threatening factors in Gulomekeda District, Northern Ethiopia. IJETST 04, 5061-5070.

Hidayati, S., Franco, F.M., Bussmann, R.W., 2015. Ready for phase 5 – current status of

Hua Z, Tzen-Yuh C 2017. Floristic characteristics and affinities in Lao PDR, with a reference to the biogeography of the Indochina peninsula[J]. PLOS ONE, 12(6): e0179966-

Iwu, M.M., 2002. Chapter 25 – Ethnobotanical approach to pharmaceutical drug discovery: strengths and limitations. In: Maurice, M.I., Jacqueline, C.W. (Eds.), Advances in Phytomedicine. Elsevier, pp. 309–320.

Jahandideh, M., Hajimehdipoor, H., Mortazavi, Sa, dehpour, A., Hassanzadeh, G., 2016.

Jai-aue, A., Makchuchit, S., Juckmeta, T., Itharat, A., 2014. Anti-allergic, anti-inflammatory and antioxidant activities of the different extracts of Thai traditional remedy called prabchompoothaweeep for allergic rhinitis treatment. J. Med. Assoc. Thai 97 (Suppl. 8), S140–S148.

Kichu, M., Malewska, T., Akter, K., Imchen, I., Harrington, D., Kohen, J., Vemulpad, S.R., Jamie, J.F., 2015. An ethnobotanical study of medicinal plants of Chungtia village, Nagaland, India. J. Ethnopharmacol. 166, 5–17.

Lamxay, V., de Boer, H.J., Bjork, L., 2011. Traditions and plant use during pregnancy, childbirth and postpartum recovery by the Kry ethnic group in Lao PDR. J. Ethnobiol. Ethnomed. 7 (1), 14.

Lu, Y., Hernandez, P., Abegunde, D., & Edejer, T. (2011). The world medicines situation 2011. *Medicine expenditures. World Health Organization, Geneva.*

Mahwasane Middleton L., Boaduo N., 2013. An ethnobotanical survey of indigenous knowledge on medicinal plants used by the traditional healers of the Lwamondo area, Limpopo province, South Africa. Journal of Botany 88, 69-75.

McFarland, B., Bigelow, D., Zani, B., Newsom, J., Kaplan, M., 2002. Complementary and alternative medicine use in Canada and the United States. Am. J. Public Health 92 (10), 1616–1618.

Menale, B., De Castro, O., Cascone, C., Muoio, R., 2016. Ethnobotanical investigation on medicinal plants in the Vesuvio National Park (Campania, Southern Italy). J. Ethnopharmacol. 192, 320–349.

Methee Phumthum, Kamonnate Sriithi, Angkhanalnta, Auemporn Junsongduang, Kornkanok Tangjitman, Wittaya Pongamornkul, Chusie Trisonthi, Henrik Balslev., 2018. Ethnobotanical plant diversity in Thailand. Journal of Ethnopharmacology 214; 90-98.

Molassiotis, A., Fernandez-Ortega, P., Pud, D., Ozden, G., Scott, J.A., Panteli, V., Margulies, A., Browall, M., Magri, M., Selvekerova, S., 2005. Use of complementary and alternative medicine in cancer patients: a European survey. Ann. Oncol. 16 (4), 655–663.

Mukungu, N., Abuga, K., Okalebo, F., Ingwela, R., Mwangi, J., 2016. Medicinal plants used for management of malaria among the Luhya community of Kakamega East sub-County, Kenya. J. Ethnopharmacol. 194, 98–107.

Municipality, Eastern Cape, South Africa. South Afr. J. Bot. 104, 69–75.

Newman M, Ketphanh S, Svengsuksa B, et al., 2007. A checklist of the vascular plants of Lao PDR. [M].

Onvilay, S., Kheithisack, P., Sang Woo, L., 2016. Medicinal and Food Plants in Dongsouth-Donglong Forest Area in Phoukout district, Xiangkhouang Province, Lao PDR. Institute of Traditional Medicine, Volume I. Ministry of Health, Vientiane Capital, Lao PDR.

- Ouelbani, R., Bensari, S., Mouas, T.N., Khelifi, D., 2016. Ethnobotanical investigations on plants used in folk medicine in the regions of Constantine and Mila (North-East of Algeria). *J. Ethnopharmacol.* 194, 196–218.
- Park, J. H., Kang, H. S., Bang, M., Cheng, H. C., Jin, H. Y., Ahn, T. H., & Phongoudome, C. (2018). Floristic inventory of vascular plant in Nam Ha national biodiversity conservation area, Lao people's democratic republic. *Journal of Asia-Pacific Biodiversity*, 11(2), 300-304.
- Pieroni, A., Söukand, R., Quave, C.L., Hajdari, A., Mustafa, B., 2017. Traditional food uses of wild plants among the Gorani of South Kosovo. *Appetite* 108, 83–92.
- Pooma, R., Suddee, S., 2014. *Tem Smitinand's Thai Plant Names, revised*. The Office of
- Ragupathy, S., Steven, N. G., Maruthakkutti, M., Velusamy, B., & Ul-Huda, M. M. (2008). Consensus of the 'Malasars' traditional aboriginal knowledge of medicinal plants in the Velliangiri holy hills, India. *Journal of Ethnobiology and Ethnomedicine*, 4(1), 8.
- Ramet, A., Benyei, P., Parada, M., Aceituno-Mata, L., García-del-Amo, D., & Reyes-García, V. (2018). Grandparents' proximity and children's traditional medicinal plant knowledge: Insights from two schools in intermediate-rural Spain. *Journal of ethnobiology*, 38(2), 187-205.
- Singh, D., Baghel, U.S., Gautam, A., Baghel, D.S., Yadav, D., Malik, J., Yadav, R., 2016. The genus *Anogeissus*: a review on ethnopharmacology, phytochemistry and pharmacology. *J. Ethnopharmacol.* 194, 30–56.
- Southavong B, Sydara K, Souliya O, et al. 2013. Medicinal plants and herbs in the Lao People's Democratic Republic Volume I. Vientiane, Lao PDR: Institute of Traditional Medicine of Ministry of Public Health. p. 399.
- Southavong B, Sydara K, Souliya O, et al. 2014. Medicinal plants and herbs in the Lao People's Democratic Republic Volume II. Vientiane, Lao PDR: Institute of Traditional Medicine of Ministry of Public Health. p. 309.
- Srithi, K., Balslev, H., Wangpakapattanawong, P., Srisanga, P., & Trisonthi, C. (2009). Medicinal plant knowledge and its erosion among the Mien (Yao) in northern Thailand. *Journal of ethnopharmacology*, 123(2), 335-342.
- Staub, P.O., Geck, M.S., Weckerle, C.S., Casu, L., Leonti, M., 2015. Classifying diseases
- the Forest Herbarium, Department of National Parks, Wildlife and Plant Conservation, Bangkok.
- Yemele, M.D., Telefo, P.B., Lienou, L.L., Tagne, S.R., Fodouop, C.S.P., Goka, C.S., Lemfack, M.C., Moundipa, F.P., 2015. Ethnobotanical survey of medicinal plants used for pregnant women's health conditions in Menoua division-West Cameroon. *J. Ethnopharmacol.* 160, 14–31.

Figures

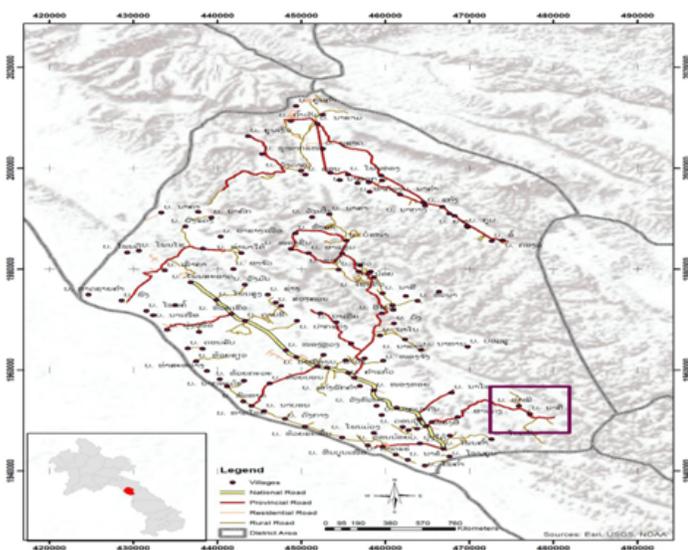


Figure 1

Map showing Hinboun district, Nakeu village study area

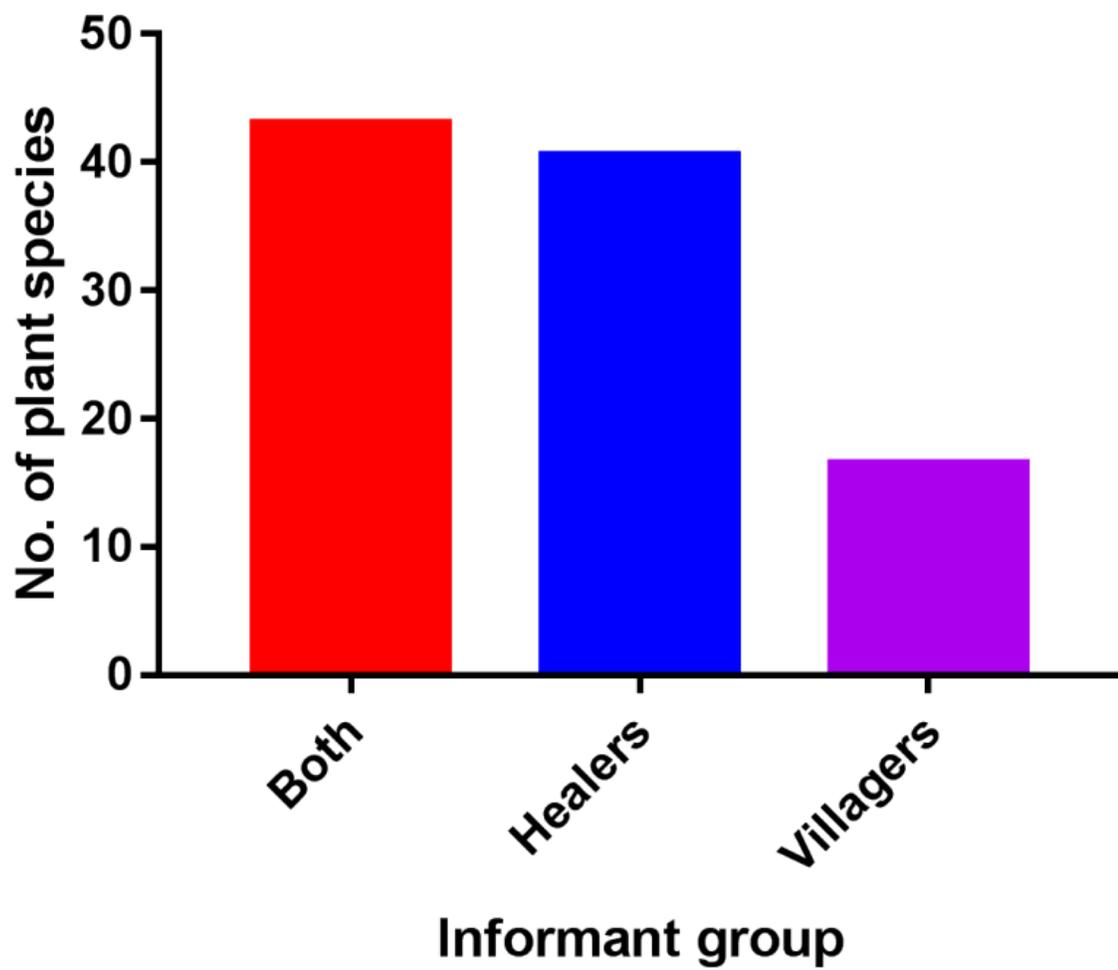


Figure 2

Number of plant species that knew by healers and villagers in Hinboun district, Khammouane province.

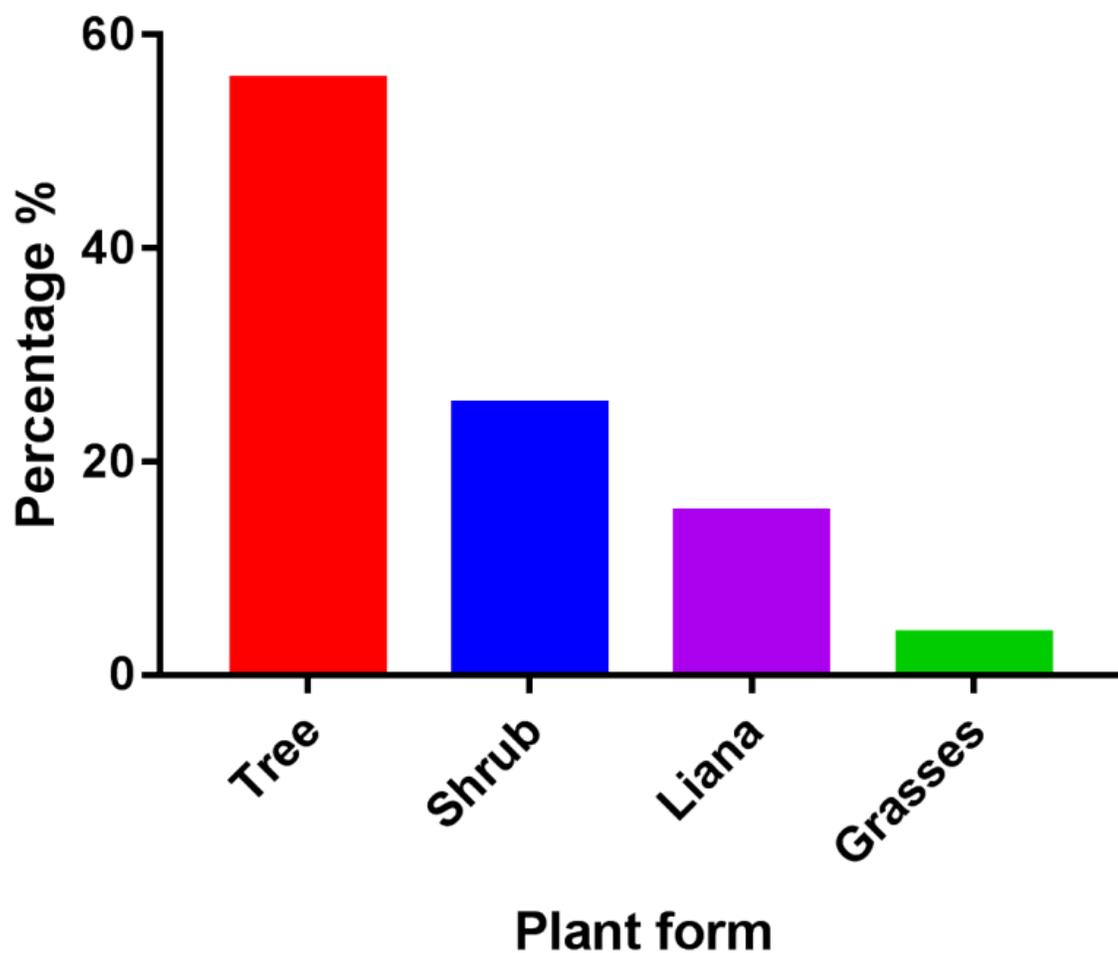


Figure 3

Plant form representation of medicinal plant in Hinboun district, Khammouane province.

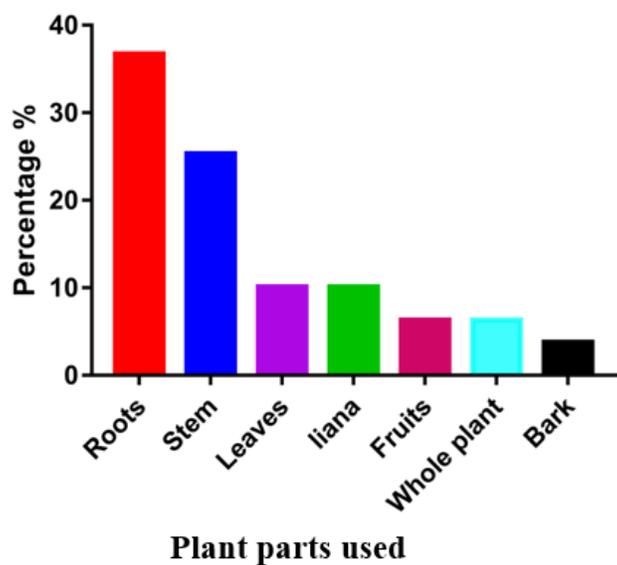


Figure 4

Percentage use of plant part use in Hinboun district, Khammouane province.

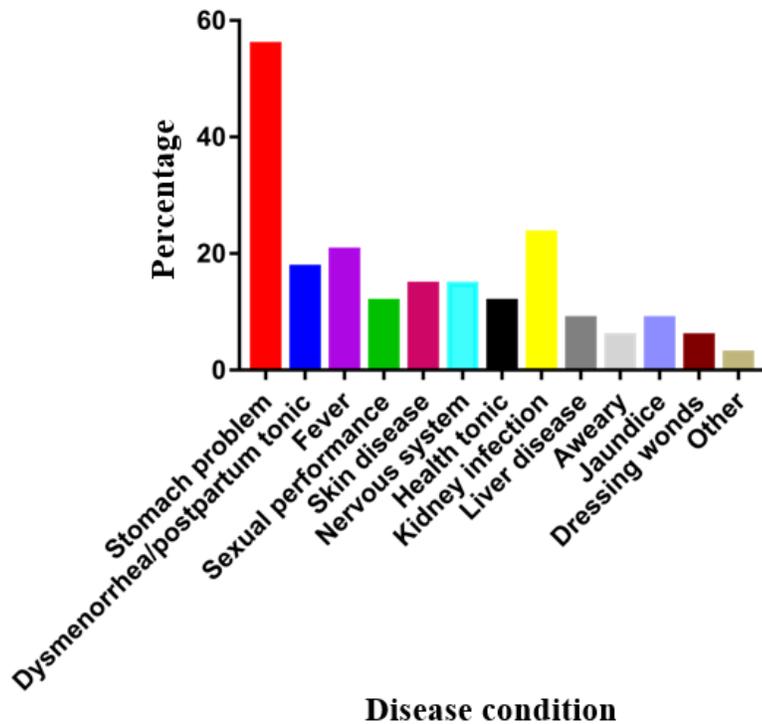


Figure 5

The frequency by percentage of the type's medicine conditions treating by the medicinal plants used in Hinboun district, Khammouane province.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Supportingdocument1.jpg](#)
- [Supportingdocument1.jpg](#)
- [Supporting4.PNG](#)
- [Supporting4.PNG](#)
- [Supporting3.PNG](#)
- [Supporting3.PNG](#)
- [Supporting2.PNG](#)
- [Supporting2.PNG](#)
- [Supporting1.PNG](#)
- [Supporting1.PNG](#)